Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Supplementary Information

Plasma-Etched CeO_2 Nanorods with Rich Defect Sites and Acidity for Dichloroethane Oxidation

Can Huo [a], *Fan Xue* [a], *Jinlin Jiang* [a], *Ming Xia* [a], *Qing Liu* [a], *Mifen Cui*[*, a], *Yuan Pan* [b], *Zhaoyang Fei*[*, a] *and Xu Qiao* [a]

[a] State Key Laboratory of Materials-Oriented Chemical Engineering, College of Chemical Engineering, Nanjing Tech University, Nanjing 211816, PR China

[b] State Key Laboratory of Heavy Oil Processing, College of Chemical Engineering, China University of Petroleum, Qingdao 266580, PR China

*E-mail: zhaoyangfei@njtech.edu.cn (Z. Fei)

*E-mail: mfcui@njtech.edu.cn (M. Cui)

Figures

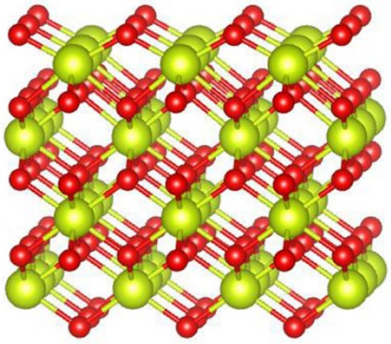

Fig. S1 The model surfaces of CeO_2 (001). Yellow and red spheres represent cerium and oxygen ions, respectively.

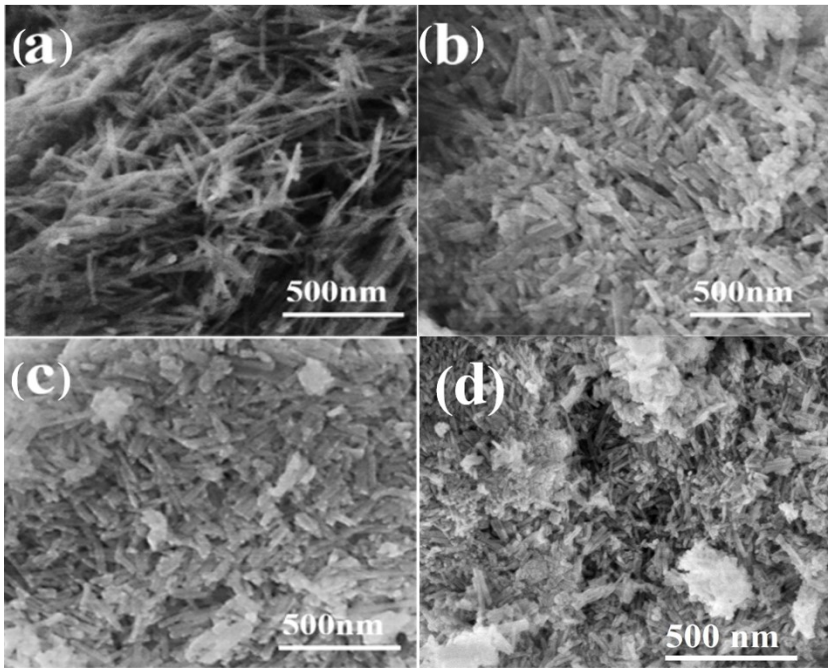

Fig. S2 SEM images of (a) T-CeO_2, (b) 20P-CeO_2, (c) 40P-CeO_2, and (d) 60P-CeO_2.

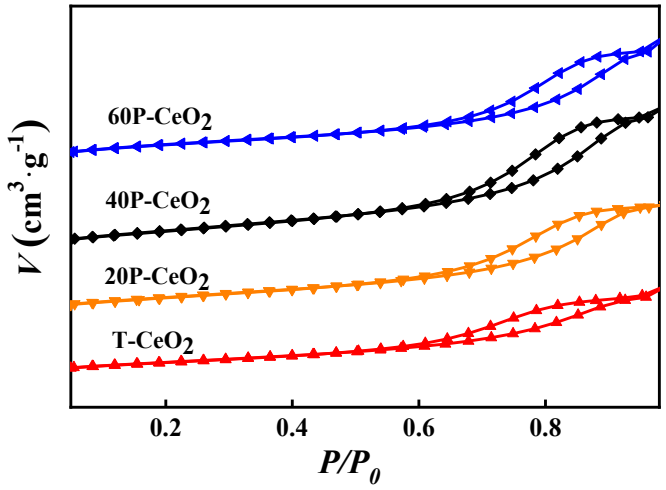

Fig.S3 N_2 adsorption-desorption isotherms of the T-CeO_2 and *n*P-CeO_2 catalysts.

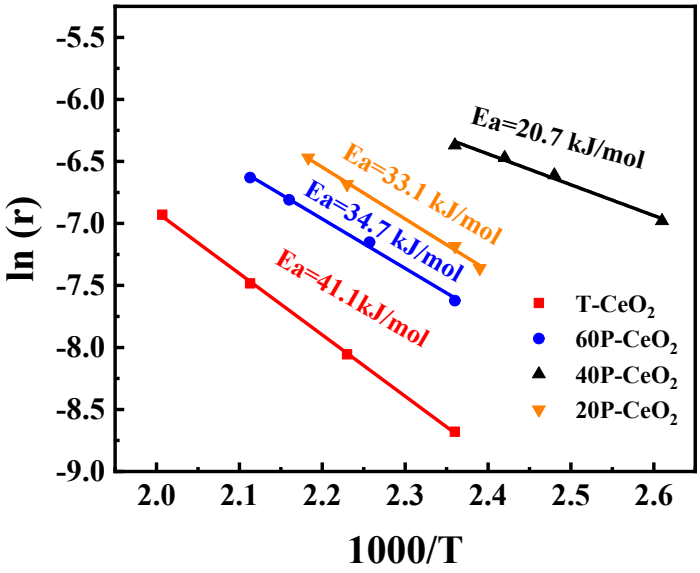

Fig.S4 Arrhenius plots of ln (r) versus 1000/T for the T-CeO_2 and *n*P-CeO_2 catalysts in the catalytic of DCE with GHSV at 20000 h^{-1}.

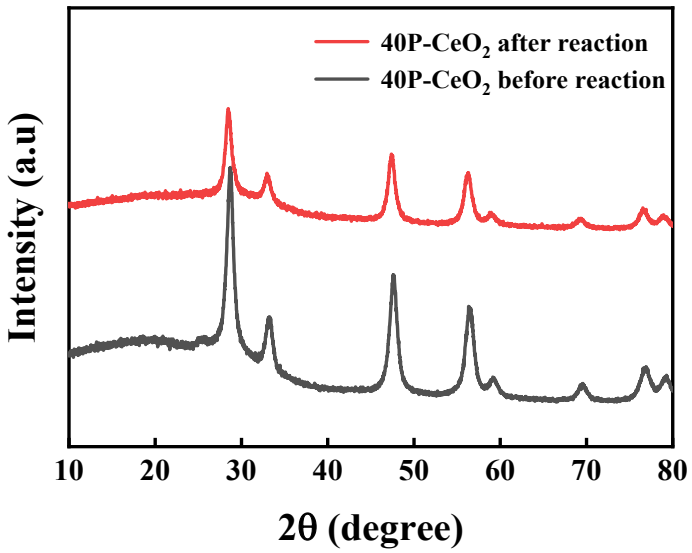

Fig. S5 XRD patterns recorded for the 40P-CeO_2 samples before and after reaction.

Table

Table S1 Comparisons of T_{50} and T_{90}

Sample	T_{50} (℃)	T_{90} (℃)	GHSV (h^{-1})	References
40P-CeO_2	215	290	20000	This work
T-CeO_2	299	374	20000	This work
Al_2O_3-CeO_2	315	385	15000	1
AlCe50/50-NC	315	385	15000	1
3DOM LSFCO	416	496	48000	2
10Co_3O_4/3DOM	390	478	48000	2
Co_3O_4	380	465	15000	3
RuO_x/Co_3O_4-HP	266	304	60000	4
RuO_x/Co_3O_4-DP	274	313	60000	4
RuO_x/Co_3O_4	280	315	60000	4
Ru/WO_3	285	320	40000	5
$ZnCo_2O_4$	276	375	48000	6
Nb_2O_5-TiO_2	246	295	15000	7
CeO_2–PrO_2	318	375	30000	8

References

1 S.X. Bai, B.B. Shi, W. Deng, Q.G. Dai, X.Y. Wang, Catalytic oxidation of 1,2-dichloroethane over Al_2O_3-CeO_2 catalysts: combined effects of acid and redox properties, *RSC. Adv*., 2015, **5**, 48916.

2 M.J. Tian, C. He, Y.K. Yu, H. Pan, L. Smith, Z.Y. Jiang, N.B. Gao, Y.F. Jian, Z.P. Hao, Q. Zhu, Catalytic oxidation of 1,2-dichloroethane over three-dimensional ordered meso-macroporous Co_3O_4/$La_{0.7}Sr_{0.3}Fe_{0.5}Co_{0.5}O_3$: Destruction route and mechanism, Appl. Catal. A: Gen., 2018, **553**, 1-14.

3 B. de Rivas, R. Lopez-Fonseca, C. Jimenez-Gonzalez, I. Jose, G. Ortize, Synthesis, characterisation and catalytic performance of nanocrystalline Co_3O_4 for gas-phase chlorinated VOC abatement, *J. Catal*., 2011, **281**, 88-97.

4 W. Deng, Z.Y. Jia, B. Gao, S.M. Zhu, D.Q. Liu, L.M. Guo, Effect of preparation method on the performance of porous RuO_x/Co_3O_4 catalysts for 1,2-dichloroethane oxidation, *Appl. Catal. A: Gen*., 2021, **624**, 118300.

5 X.H. Yu, L.Y. Dai, J.G. Deng, Y.X. Liu, L. Jing, X. Zhang, R.Y. Gao, Z.Q. Hou, L. Wei, H.X. Dai, An isotopic strategy to investigate the role of water vapor in the oxidation of 1,2-dichloroethane over the Ru/WO_3 or Ru/TiO_2 catalyst, *Appl. Catal. B: Environ*., 2022, **305**, 121037.

6 Z.H. Chen, Z.P. Ye, H. Pan, X. Ling, J. Chen, X.M. Zhang, Bifunctional $ZnCo_2O_4$ catalyst for NOx reduction and 1,2-dichloroethane, *Catal. Commun*., 2022, **166**, 106452.

7 P. Yang, J. Li, L.F. Bao, X. Zhou, X.W. Zhang, S.K. Fan, Z.Y. Chen, S.F. Zuo, C.Z. Qi, Adsorption/catalytic combustion of toxic 1,2-dichloroethane on multifunctional, *Chem. Eng. J.*, 2019, **361**, 1400-1410.

8 B. de Rivas, N. Guillén-Hurtado, R. López-Fonseca, F. Coloma-Pascual, A. García-García, J.I. Gutiérrez-Ortiz, A. Bueno-López, Activity, selectivity and stability of praseodymium-doped CeO_2 for chlorinated VOCs catalytic combustion, *Appl. Catal. B-Environ*., 2012, **121-122**, 162–170.